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Lynn Reed  
 28/Feb/08 8:49 am  
 Read: 133 times  
 Austin  
 USA

**Msg Score: +1**  
**+1 Informative**

#151593 - Why the 330K resistor is needed [New](#)

Responding to: Sandy Archer's previous message

An oscillator needs to have 360 degrees of phase shift to work. The inverter provides 180 degrees, and the crystal adds another 90 degrees. It is the last 90 that is the problem.

In a 12 MHz oscillator, 90 degrees = 20 ns. The propagation delay through the inverter may be 10 ns, and the rc delay due to the inverter output impedance driving the load capacitor can add the balance.

At 32 KHz, 90 degrees = 7.6 **MICRO**seconds. There is no way that you are going to get that sort of delay through an inverter. So you need to build an RC delay. 300K ohms and 30pf equals 9us. The signal amplitudes adjust themselves, which adjusts the delays, and you get the exact 360 degrees.



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**List of 13 messages in thread**

| Topic  | Author        | Date               |
|--|---------------|--------------------|
| Capacitor for 32.768 crystal                   | Sandy Archer  | 26/Feb/08 7:43 pm  |
| Maybe the crystal can needs grounding?         | Dale Callaham | 26/Feb/08 10:18 pm |
| Do never solder the can!!! 🤖                   | Kai Klaas     | 27/Feb/08 2:03 pm  |
| Do never solder the can...                     | Ap Charles    | 27/Feb/08 2:21 pm  |
| So do I...                                     | Kai Klaas     | 27/Feb/08 2:27 pm  |
| A berylium copper "touchie" is a good solution | Erik Malund   | 27/Feb/08 2:39 pm  |
| 32 KHz Oscilator, Capacitors and Resistor      | Lynn Reed     | 26/Feb/08 10:34    |